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for the Behavioral and Social Sciences

Research Report 1813

Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST) Limited User/Functional Test

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U.S. Army Research Institute

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13. SUPPLEMENTARY NOTES

14. ABSTRACT *(Maximum 200 words)*:

This paper documents the technical advisory service provided by the U.S. Army Research Institute for the Behavioral and Social Sciences to the Training and Doctrine Command (TRADOC) Systems Manager Stryker/Bradley (TSM-SB) in a comparison assessment of the Bradley Conduct of Fire Trainer (COFT) and the Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST). The informal limited user/functional test collected data in two areas. The first portion of the test was designed to compare the stated capabilities of the AB-FIST as compared to those of the COFT. The second portion of the test was designed to elicit feedback from experienced users about the new device. Based on this limited test, the AB-FIST was seen to perform as well as or better than the COFT, and could be used to supplement or augment the COFT where that device is unavailable.

15. SUBJECT TERMS

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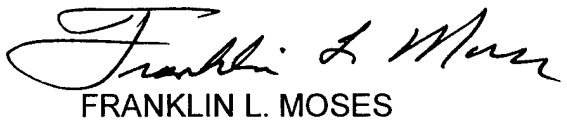
FOREWORD

The U. S. Army Research Institute for the Behavioral and Social Sciences (ARI), Infantry Forces Research Unit, at Fort Benning, GA was asked to provide technical advisory service to the Training and Doctrine Command (TRADOC) Systems Manager Stryker/Bradley (TSM-SB) in a comparison assessment of the Bradley Conduct of Fire Trainer (COFT) and the newly developed Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST). In an effort to augment their system of training devices for precision gunnery training, the Army National Guard (ARNG) funded development of the AB-FIST device.

The informal subject matter expert test described herein was an effort to collect data in two areas. First, the test was to compare the stated capabilities of the AB-FIST in comparison to those of the COFT. Secondly, experienced users were asked for feedback on the new device. In both respects the AB-FIST fared well. The device was seen to perform as well as or better than the COFT in every respect. The ARI findings have been briefed to the TSM-SB and to personnel throughout the U.S. Army Infantry School.



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The Army Research Institute at Fort Benning wishes to commend the hard work and extraordinary cooperation exhibited by the present and former Master Gunners of Fort Benning and Fort Knox, and those of the Army National Guard, the U.S. Army Infantry School, and the Bradley Proponency Office. They made the AB-FIST project come to life.

Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST)
Limited User/Functional Test

EXECUTIVE SUMMARY

Research Requirement:

The Training and Doctrine Command (TRADOC) Systems Manager Stryker/Bradley requested that the U. S. Army Research Institute for the Behavioral and Social Sciences (ARI) perform an independent assessment of a limited user test of the comparison of the Bradley Conduct of Fire Trainer (COFT) and the Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST). The AB-FIST, an appended trainer, was funded by the U. S. Army National Guard for potential use as a precision gunnery training device. ARI was asked to observe the test and collect user satisfaction data.

Procedure:

An ARI researcher observed the weeklong test at the AB-FIST contractor's facility and surveyed the subject matter experts (SMEs) who served as Bradley Commanders, Gunners and Instructor/Operators (I/Os) during the test. ARI also conducted individual structured interviews with test participants. The numbers of personnel fluctuated, but there were 14 key personnel representing both Active and Reserve Component Bradley Master Gunners.

Findings:

The functional comparison data provided confirmation that the AB-FIST performed as well as or better than the COFT in the measured areas. The user survey data and interview results paralleled these findings. The participants overwhelmingly accepted the AB-FIST as a viable gunnery trainer. The graphics were said to present better and more challenging gunnery situations than the COFT, and the I/O station and functions were clearly preferred over the COFT's I/O station for ease of use and training enhancement.

Utilization of Findings:

The results of the AB-FIST and COFT comparison have been briefed formally and informally to key personnel in the TSM-SB Office, the National Guard Bureau, and the U.S. Army Infantry School. The ARI assessment can be used to assist decision makers in identifying future Bradley gunnery training devices.

Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST): Limited User/Functional Test

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Introduction

When the precision gunnery trainer, the Conduct of Fire Trainer (COFT), was first fielded for Army tank and Bradley Fighting Vehicle (BFV) crews in the late 1970s and early 1980s, it represented the state of the art in gunnery simulators for the mechanized force. Three forms of COFT were envisioned. For unit sustainment training the COFT was a standalone system of shelters, mounted on a concrete pad, not far from training areas. One section of the shelter was allocated to house the computers that drove the system, and the other half contained the mock-up of the vehicle turret, as well as an instructor/operator (I/O) station from which a trained instructor could oversee and guide gunnery training. A small area of the shelter was designated for pre and post training briefings, as well as providing an area for crews to observe ongoing training. The computer generated graphics presented simulated targets and situations to novice and experienced crews. These COFTs were designated Unit Conduct of Fire Trainer (U-COFT). At most locations, several U-COFTS were co-located for easy training access, efficient throughput, and to facilitate the unique power requirements of the systems.

For training at Fort Knox and Fort Benning, the I-COFT (I for institutional) was designed so it could be housed within a building, instead of as a standalone shelter. This system provided a set of COFTs that could potentially be simultaneously observable by one senior I/O (SIO) or where one I/O could maintain some control over four co-located systems.

The third type of COFT was designed specifically to meet the unique needs of the U. S. Army National Guard (ARNG). With one weekend a month, and two weeks in the summer, for 39 days a year, the Guard was at an extreme disadvantage for gunnery training even before the COFT was developed. It was difficult to train and sustain gunners and commanders. The battalions of the Guard's mechanized brigades are often spread over hundreds of miles from each other. The ability to bring gunnery crews to a centrally located U- or I-COFT was impractical, and generally impossible given the extremely limited time available for ARNG training. When the COFT was designed, therefore, a third version was especially planned to be transportable between National Guard Armories, to actually move across highways from one city to another to bring the training to the unit. This COFT gunnery trainer, the M-COFT (M for mobile), was housed in a specially designed transportable shelter, and hauled from site to site on a dedicated carrier.

The Problem

Although the M-COFTs initially appeared to be a good solution, after a few years it became very apparent that the actual movement of these gunnery trainers caused considerable wear and tear on the systems, and on the trailers themselves. Additionally, the time spent setting the trainer up at a new location was longer than

expected, and frequently the trainers were not available when or where the troops were. The contractor provided field service representatives (FSRs), but they could not keep up with the calls, most of which occurred on weekends. When there were maintenance-related, or in-use crashes, the time required to get them repaired was sufficiently long to make the M-COFTs unavailable for training much of the time.

Potential Resolution

Several attempts were made to remedy the COFT problem for the ARNG, or to find solutions to the problem that had surfaced. For the Bradley fleet several part-task and table top gunnery trainers were developed to try to reduce the precision gunnery deficiency, or at the very least, to provide a way to accommodate the requirement for every crew to have at least four hours in training on a simulator before progressing to live fire. One solution was provided by RAYDON, Inc. in the mid 1990s. RAYDON developed and tested an appended trainer that would provide COFT- like graphics and scenarios to a crew sitting inside a real vehicle. The intent was to have a device that did most of what a COFT was supposed to do but, but since it was appended to a real vehicle, it could be more easily moved than the M-COFT. At the time of its Fort Benning user-test, the primary focus of the Full-crew Interactive Simulation Trainer-Bradley (FIST-B) was on an attempt to link the turret crew with the Infantrymen who ride in the back of the vehicle and dismount to fight as Infantry. This effort was documented in Salter (1998). The assessment was planned to examine the training link between the Bradley crew and its dismounted element; the value of the appended FIST-B as a gunnery-training device was never in question. This test showed almost insurmountable difficulties with the dismounted portion of the trainer and the relative goodness of the turret appended gunnery trainer for the crew was not addressed.

Considerable research, together with lessons learned from the FIST-B, provided information sufficient for RAYDON to make an appended precision gunnery trainer for the tank crews of the National Guard. In the late 1990s they developed the AFIST (Abrams Full-crew Interactive Skills Trainer), followed by an upgraded version (AFIST XXI). The AFIST is an appended training device that trains both precision and degraded mode gunnery tasks. It uses the actual vehicle controls, and low cost commercially available equipment, and trains the gunner in accord with the standards of the tank gunnery manual. Over 150 AFISTs and/or AFIST XXI systems are in use. The AFISTs provide a standardized gunnery program permitting scoring, crew critiques, and transfer of files. They are mobile systems, suitable for the ARNG to provide precision gunnery training for its tank crews.

The Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST)

Given the success of the AFIST, a similar effort for Bradley crews was initiated with the Advanced Bradley Full-crew Interactive Simulation Trainer (AB-FIST). Early variants of this device (essentially a FIST-B without dismounted Soldiers) were fielded, initially to the South Carolina National Guard. With the enthusiastic response of the

ARNG, and with support from National Guard Bureau, RAYDON continued with development of the AB-FIST device.

The AB-FIST is an appended device that trains the Bradley commander (BC), gunner and driver of the M2A2/A3 or the M2A2/A3 ODS. Exercises are patterned on the COFT Bradley Advanced Matrix. AB-FIST provides power and manual engagements, and offers degraded mode gunnery. It includes 25mm, coax and TOW engagements, and the auxiliary sight. It uses commercial computers and printers, and can be run off a standard military 10kw generator or off 110-volt/30-amp power. The software interfaces with overlays appended to the actual vehicle. (Further description of the AB-FIST device is available from RAYDON, 2003). The interim set, the version tested, is being fielded in limited numbers before the Government Acceptance Test (GAT) in the summer of 2004. At GAT, the second release will include full driver involvement, special purpose exercises, and other exercises to provide better gunnery training. It will also demonstrate four networked simulators so section and platoon gunnery engagements can be conducted.

Throughout the spring of 2003, Bradley subject matter experts (SMEs), both Active and Reserve Component personnel, met repeatedly at the contractor's facility to work on the AB-FIST. The overall project, funded by the ARNG, received what could be termed unprecedented cooperation between the National Guard and Fort Benning's Bradley Proponency Office and Master Gunner Branch. The SMEs worked together to ensure accuracy of every aspect of the device, and to ensure that user requirements were being incorporated. The intent was to develop a trainer that would provide the same training for the ARNG as the COFT does for the Active Force. If fielded, AB-FIST would augment many of the existing but often-unusable M-COFTs, thereby enabling the ARNG to achieve and maintain the same training standards as the active component.

Purpose of This Report

The purpose of this report is to describe the circumstances and results of a limited user test of the AB-FIST device. The test was conducted at the Daytona Beach, FL, RAYDON facility during the week of 14-18 July 2003. In addition to technical support personnel from RAYDON, representatives from the Program Executive Office for Simulation, Training, and Instrumentation (PEO-STRI) in Orlando, and Bradley SMEs, both active duty and retired, from Fort Benning and Fort Knox, participated in various aspects of the test. The Army Research Institute (ARI) at Fort Benning was asked to assist by providing questionnaires and interviews to the Bradley-experienced participants.

Intent of the User Test

Often prevented by time and distance from successfully using the existing device (COFT) to meet pre-live fire simulation requirements (minimally four hours of simulation before live fire), the ARNG wants Bradley crews to be able to use the AB-FIST device as a gate to live fire in addition to the M-COFT. The overall intent of the test, therefore,

was to provide a simulated side-by-side comparison of the AB-FIST with the COFT, to check the validity of the task analysis that said the AB-FIST replicates the COFT and therefore can be used in the same way as the COFT. All personnel were required to have sufficient Bradley experience and knowledge of the vehicle and of the COFT to be able to make mental comparisons between the two devices. If the AB-FIST system meets or exceeds the standards established for the COFT, the AB-FIST device would provide an alternative way for the ARNG to achieve the Army standard.

Test personnel from PEO-STRI developed an overall test plan with feedback from all the SMEs. Since the primary intent was to compare the COFT and the AB-FIST, most of the test was planned to try to provide as many opportunities as possible for device comparison, although some time was allocated for testing resolution of previously identified Incident Reports (IRs). (The plan and its post-testing final report are available from PEO-STRI, August 2003.)

The ARI researcher, experienced with BFV training devices, was an independent evaluator and data collector. This role involved full observation of the test. This included monitoring instructions, training, and after action reviews as well as noting overall procedures and anomalies. It also included administration of questionnaires, and structured interviews. Throughout the week, ARI made miscellaneous observations and obtained real-time comments from test personnel.

Method and Procedures

Each morning the participants met in a conference room in the contractor's facility to address the day's tasks. The routine varied, based on the activities of the preceding day. On the first day, PEO-STRI personnel and an ARNG representative described the overall conduct of the test. ARI administered demographic surveys to all, regardless of whether they were planning to be present for the full week of testing, and then described the surveys and structured interviews that would take place later in the week.

After the morning meeting, the test group, a combination of active duty and reserve component personnel, plus civilian contractors and Government personnel, moved to the simulator bay area. AB-FIST use continued throughout each day, and crews exchanged positions. At the end of the day the entire group met again in the conference room to discuss the day's events, and to try to resolve any outstanding issues, or formulate plans for addressing those that could not be settled.

Prior to this COFT and AB-FIST comparison test, interim functionality tests had been conducted and some hardware and/or software issues surfaced. Therefore during the first few days the crews and I/Os addressed specific IRs to ensure that these problems had been fixed. The IRs were generated (documented) whenever anything unexpected happened during any AB-FIST testing. The IRs varied from the absence of a target or the wrong target or a problem with timing of a target, to documentation of a system freeze-up or crash. Some IRs were definitely training distracters and their

causes had to be identified and fixed. Other IRs were minor, and generally inconsequential. Many could not be replicated. Some were initially controversial, in that different SMEs had different opinions as to the severity or importance of specific items, but by the end of the test, the SMEs were in concurrence.

After the IR resolution task was complete, the crews "fired" a series of exercises to test the system. An additional benefit was that this provided many gunnery trials for each of the Soldiers involved. Data were collected to document that the AB-FIST performed the same functions as the COFT. When the BC or gunner exited the turret, or the I/O finished his tasks, they completed questionnaires. During the final two days, ARI conducted structured interviews with each participant. Interviews were held in an area away from the test site so each individual could be provided privacy and anonymity. A final rating of the AB-FIST was also obtained at this time.

Results

The results of the PEO-STRI comparisons are reported separately (August 2003) but can be summarized as follows. The intent of the test was to verify the ability of the AB-FIST system to meet the training objectives and live fire prerequisites that are currently satisfied by the COFT. After the final IRs are closed, the AB-FIST will have performed equal to or better than the COFT in all functional requirements identified as common between the two training systems. The ARI assessment supported this conclusion, and provided evidence of extremely high user satisfaction. Following a summary of the PEO-STRI results, a summary of the ARI data will be reported in the order in which the surveys were administered. Full data can be found in Appendix B. (Appendix A provides acronyms.)

Comparison to COFT

The full comparison of these devices, the COFT and the AB-FIST, can be found in the PEO-STRI report. Table 1 provides a simplified version of the results. The post-test status includes some outstanding IRs. The SMEs agreed that most are minor and not training distracters; all will be resolved prior to GAT. The determination of the meets the COFT or exceeds the COFT success criteria was made by the SMEs at the end of testing. Clearly the AB-FIST achieved the intent in this respect.

Experience Questionnaire

Different personnel were available each day, but the sample was representative of the potential user group. The test subjects were extremely knowledgeable about the Bradley, the COFT, and gunnery. Of the 17 key personnel involved in the AB-FIST test over the course of the week, seven were from the ARNG, six were other active duty personnel, and four were retired noncommissioned officers (NCOs). They had been drivers, gunners, and BCs and had been platoon, company, battalion and brigade master gunners. Of the 15 NCOs (2 Master Sergeants, 11 Sergeants First Class, 2 Staff Sergeants) 14 (all but one) are Master Gunners, and school-trained COFT I/Os

and SI/Os. The two officers participating, both Infantry branch, had many years experience in Bradley units.

Table 1
AB-FIST and COFT Comparison (adapted from PEO-STRI, 2003)

Item to be Compared to COFT	Result	IRs	Item to be Compared to COFT	Result	IRs
Startup – Power up/down	Exceeds	1	Tracer Effects	Meets	0
Preparation for Training	Meets	2	Smoke Grenades Obscuration	Meets	0
Instructor/Operator Station (IOS)	Exceeds	2	TOW Obscuration	Meets	1
Performance Monitoring	Exceeds	0	Target Effects	Exceeds	1
Turret	Meets	1	Sights	Meets	1
Stabilization System	Meets	4*	Integrated Sight Unit (ISU)	Meets	1
Bradley Eyesafe Laser Ranger Finder (BELRF)	Meets	0	Commander's Sight Extension (CSE)	Exceeds	0
Weapon Control Box	Meets	1	Auxiliary Sight Unit (ASU)	Meets	1
Turret Control Box	Meets	0	Visibility Conditions	Exceeds	0
Tow Control Box	Meets	0	ISU, CSE and ASU Stabilized	Meets	0
Ammunition Reloading Procedures	Meets	0	Simulated Vehicle Performance	Exceeds	2
Annunciator Panel	Meets	0	Vehicle Movement without a Driver	Meets	3
Turret Position Indicator	Meets	0	Weapons	Meets	1
25mm Gun Bolt Position Indicator BPI	Meets	0	Communications	Exceeds	0
Travel Lock Lever	Meets	0	Preprogrammed Training Exercises	Exceeds	0
ISU Overlay	Exceeds	0	Prepare to Fire Exercise	Exceeds	0
Commander's Position Tasks	Exceeds	0	Scoring	Meets	0
Gunner's Position Tasks	Exceeds	0	Engagement Scoring	Meets	0
Simulated Sound effects	Meets	0	Crew Station Switch Settings	Meets	0
Printer	Exceeds	1	Training Exercises	Meets	10*
Keyboard and Mouse	Exceeds	0	Playback	Meets	1

Note. *The stabilization (STAB) IRs are considered important, but fixable. The Training Exercise IRs were problems that occurred during one iteration of the exercise, but were not reproducible.

The average total time in service was 19.12 years, with 13 years the minimum. Excluding the officers (one Active Component, one Reserve Component), the ARNG personnel averaged 17.55 years in service; the active duty personnel averaged 17.25 years. They had spent an average of 13.62 years in Bradley units. One NCO was a Scout from Fort Knox; another had also served as a tanker. The officers and two NCOs had been to the Bradley Leader Course. Most Bradley experience was concentrated on the M2/M3A2 and the original M2/M3; nine said they had little experience on the newest M2/M3A3 variant.

Test SMEs were asked about their experience with BFV training devices. All were very familiar with the COFT, and depending on seniority, with either Simulation Networking (SIMNET) or the Close combat Tactical Trainer (CCTT) devices. Some were experienced with the precision gunnery system (PGS); few had much hands-on experience with the Bradley Advanced Training System (BATS), the COFT-like device for the M2/M3A3 vehicle. When asked for self-report on their most recent Table VIII qualification scores, all said qualified, distinguished or trained, the specific nomenclature depending on the age/retirement status of the Soldier.

AB-FIST Post Training Surveys

The first set of surveys was designed to elicit reactions to the AB-FIST from experienced crews, and to compare the AB-FIST to their memories of the COFT and of the real vehicle. Three separate surveys were provided; there was some overlap between the respondents as everyone took the survey based on the position he had just finished. Some Soldiers took all three surveys; others took only one or two. The officers were BCs only and did not serve as gunner. Additionally, neither of them is a certified I/O and therefore did not serve in that position.

The first survey asked the BC to compare the AB-FIST (a simulation in a real Bradley) to his own vehicle (OV) (a Bradley) and also to compare the AB-FIST(a simulation in a real Bradley) to the COFT (a simulated Bradley). The instructions asked, "How well did the AB-FIST allow you to perform the following functions? Compare the **AB-FIST** to your **own vehicle (OV)** and compare it to the **COFT**." Possible responses ranged from Much Easier (ME); Easier (E); Same (S); Harder (H); to Much Harder (MH), with an NA for no answer or does not apply/did not perform this function.

Although the AB-FIST was compared to the own vehicle (to find any anomalies) the comparison of primary interest was the COFT. (The full data, including own vehicle, are shown at Appendix B.) The AB-FIST fared well. There were some areas where the 12 BCs said performing the activity in the AB-FIST was the same or easier than in the COFT – e.g., prepare to fire checks, post-fire operations, and power down the commander's station. Table 2 shows that AB-FIST was frequently seen as harder (presents a greater challenge) in some critical areas. The commander's job is to acquire targets, and in many cases to identify them. Having the task difficult during training kept the Soldiers' interest during the training despite their overall expertise. Several of them wrote in the margins of their surveys to say "harder is a good thing." (Easier/Much Easier and Harder/Much Harder Categories are combined in Table 2.)

Table 2
BC Post Training Survey (Percentage Selecting Easier, Same, or Harder)

Compared to COFT, AB-FIST is	**ME/E**	**S**	**H/MH**
Acquire targets	27	36	36
Identify targets - ISU day	30	50	20
Identify targets – thermal	25	58	17
Distinguish between friendly and enemy targets	50	33	17
Determine most dangerous target	33	58	8
Sense rounds	50	42	8
Estimate range ISU – day	60	40	0
Estimate range ISU – thermal	40	60	0
Conduct target handoff process	25	67	8
Perform battle damage assessment	55	27	18
Service multiple targets	25	42	33
Track, lead & engage tgts using 25mm BC station	50	42	8
Track, lead & engage tgts using coax BC station	58	42	0
Use Aux sight	33	44	22
Engage targets NBC mode	33	67	0

A similar questionnaire was also presented to 14 Gunners. The combined results are shown in Table 3. The introductory material and the scales were the same as for the BCs. Again, the AB-FIST compared well to the COFT. From the gunner perspective, the AB-FIST presented a greater training challenge than COFT, or was about the same as the COFT. There were no areas where the AB-FIST was perceived as worse than the COFT.

Table 3
Gunner Post Training Survey (Percentage Selecting Easier, Same, or Harder)

Compared to COFT, AB-FIST is	ME/E	S	H/MH
Acquire targets	36	36	28
Identify targets - ISU day	36	50	14
Identify targets – thermal	36	43	21
Distinguish between friendly and enemy targets	46	31	23
Track, lead & engage tgts - 25mm power mode	21	50	28
Track, lead & engage tgts - 25mm manual mode	13	75	13
Track, lead & engage tgts - coax power mode	36	43	21
Track, lead & engage tgts – coax manual mode	29	57	14
Track, lead & engage tgts – TOW power mode	28	43	28
Track, lead & engage tgts – TOW manual mode	40	40	20
Sense rounds	50	28	21
Adjust rounds	28	50	21
Estimate range – ISU Day	31	62	8
Estimate range – thermal	36	55	9
Determine most dangerous target	28	57	14
Perform misfire procedures	0	93	7
Engage targets stationary OV – stationary target	38	46	15
Engage targets stationary OV – moving target	36	50	14
Engage targets moving OV – stationary target	30	40	30
Engage targets moving OV – moving target	33	33	33
Engage tgts stat & moving OV – stat & moving tgts	30	40	30
Use AUX sight	50	38	13
Engage targets NBC mode	29	57	14
Engage targets at dawn/dusk	44	33	22

Each of the surveys had two free response questions, discussed together since many of the respondents were the same. Asked if the AB-FIST helped with crew coordination, all who responded said yes and no one said no. A few left the question unanswered; questioned, they said they felt they might have improved over time using AB-FIST, but were already performing well. Asked if there were any areas where the AB-FIST did not train to standard, 75% said no; 25% cited the previously identified IRs as the only areas where training was not to standard.

The final post training survey (see Table 4) compared 14 I/Os' experiences in using the AB-FIST and the COFT. The questions reflect I/O duties using the training devices. The I/Os also rated the AB-FIST as fully comparable to or better than COFT. They were asked the open-ended questions as well. Asked if there were any areas where the AB-FIST crew could not train to standard, 10 said no, one cited an IR, and

three did not answer. When asked if there were any areas where they, the I/Os, could not do their jobs to standard, 10 said no, 2 cited an IR, one did not respond.

Table 4
I/O Post Training Survey (Percentage Selecting Easier, Same, or Harder)

Compared to COFT, AB-FIST is	ME/E	S	H/MH
Power up the trainer	100	0	0
Prepare I/O station for operation (monitors, etc.)	100	0	0
Enter crew records	78	22	0
Plan and Conduct pre-brief	64	36	0
Use the I/O's monitor screen	86	14	0
Read words on the I/O's monitor screen	29	50	21
Distinguish icons and symbols on the I/O screen	93	7	0
See commander and gunner monitor screens	54	31	15
Monitor crew performance	64	29	7
Hear crew verbal exchanges (fire cmds, alerts)	21	71	7
Acquire targets	64	29	7
Critique crew performance	64	36	0
Interpret scoring	57	36	7
Evaluate written records	57	43	0
Play back engagements	67	33	0
Plan/conduct debrief	36	64	0
Save crew records	83	17	0
Change crews	85	15	0
Power down system	100	0	0
Troubleshoot system	86	14	0

The I/O responses about the AB-FIST were extremely favorable. Each of the SMEs was a very experienced I/O and they had no difficulty making the comparisons. The only areas where AB-FIST was perceived as harder or much harder were four where the I/O's vision was probably a contributor, one where hearing was an issue, and only one where the scoring was problematical. Again, the SMEs wrote in the margins of their surveys to indicate how much easier their job was using the AB-FIST.

Crew and I/O Overall Surveys

Another set of surveys served as summaries administered at the end of the week. Personnel were given either crew surveys or I/O surveys, with the spread deliberately about half and half to each survey. Some questions were position specific, but three questions were similar and seven were identical across both surveys. Unlike the previous surveys where the AB-FIST was compared to the COFT, in these surveys the questions were asked about the AB-FIST alone.

The complete results are shown in the Appendix B but the overlapping questions are as shown in Table 5. For these surveys the responses ranged from Strongly Agree (SA) to Agree (A), neither Agree nor Disagree (N) Disagree (D) to Strongly Disagree (SD). The AB-FIST was overwhelmingly successful. The very favorable results for the AB-FIST are despite the fact that all personnel were very experienced gunners, BCs

and I/Os, with little room to improve performance, and despite the fact that the questionnaires were administered at the end of the week when the Soldiers might have been tired of the experiment and questions, or simply bored with it. At no time was the AB-FIST downgraded. The percentages of favorable responses are very high.

Table 5
Overall Survey: Crews (N = 7) and I/Os (N = 5) (Percentage responding)

The training provided by the AB-FIST	**SA**	**A**	**N**	**D**	**SD**
was at a pace and tempo that met my needs/crew needs	42	42	16	0	0
was conducted to standard, ***not*** to available time	50	50	0	0	0
has enough variety to hold my interest/crew interest	58	42	0	0	0
The gunnery training provided by the AB-FIST					
was beneficial to the test crews	58	42	0	0	0
would be beneficial to new crews	75	16	8	0	0
would be beneficial to experienced crews (sustainment)	58	42	0	0	0
would be beneficial to crews (prepare for Table VIII)	58	33	8	0	0
was to the standards of FM 23-1/ FM 3-22.1	42	58	0	0	0
provides a reliable gate to live fire	42	42	16	0	0
is as good as the training provided by the COFT	67	33	0	0	0

The surveys described above were very clear in one respect. At no time did the AB-FIST fail to live up to expectations or present a less than useful training experience for these experienced gunners. These data are a strong endorsement for the device.

Structured Interviews

During the final two days of the user test, structured interviews were conducted with 14 key personnel. Given the loose structure of the test, and the somewhat transient population, some personnel who had been there early in the week were no longer present during the final days when the interviews were conducted; some new personnel had arrived after the first day of testing. However, the 14 who submitted to the approximately 20 minute interview were considered not only very experienced with the COFT and with the AB-FIST and the Bradley, but by their diversity, quite representative of the user test population and the Bradley population at large. Of the 14, two were officers (a LTC and a Colonel) and twelve were NCOs. Seven of the 14 personnel were ARNG, and 7 active duty Soldiers. Of the 14, 3 had retired from active duty. All of the retired Soldiers have stayed in close contact with the Bradley community since retirement and maintained both their interest in the field and their gunnery knowledge.

The interview questions focused on several areas and will be addressed (paraphrased) in the order in which they were asked. Generally the first questions covered graphics and sound, followed by the respondent's statements as to the best and worst aspects of the AB-FIST. The next questions pertained to use of the AB-FIST from an I/O's perspective. The final section asked about use of the AB-FIST device in lieu of, or to augment or complement the existing COFT device.

The ARI researcher and the Soldier were seated at a location comfortably away from the AB-FIST test area, where privacy was guaranteed. Each individual was asked to speak freely. All were quite comfortable in the presence of the questioner and appeared to have no hesitation in speaking. The questions were as follows:

1. *How do the graphics compare to the graphics in the COFT? In CCTT?*
All 14 said the AB-FIST graphics were better than the COFT graphics; seven of the 14 said they were better than on the CCTT. The other seven were not sufficiently familiar with CCTT to make any assessment. An early question had surfaced about a potential training distracter caused by the blurring of the visual display when the turret was in the fast slew mode. Of the 14, 12 said they had not noticed it at all, the other two said they had but that it was "no big deal" and definitely not a distracter in any way. The blur, apparent (if at all) comes because of the limitations of flat panel technology and screen update rates. By the GAT, technology may have advanced so the blur does not occur at all. As one of the officers pointed out "No one is shooting in the middle of fast slew anyway," i.e., it was not a problem.

2. *How does sound in the AB-FIST compare to sound in your OV? in COFT?*
Seven said the sound needs work, the other half said it was "pretty good" or OK. There were a few problems with the AB-FIST's sounds. The current (temporary) troop compartment location of the audio speaker reduced the ability of some personnel to hear gun sounds and round cycling. Interviews suggest this is more a function of the individual's hearing rather than a problem with the location or volume of the speaker itself, but the loudspeaker will be moved in later versions. In another issue, there was concern that some did not accurately replicate Bradley sounds. [A tape has been provided to the contractor to resolve the problem.]

3. *Were there any areas where you felt the crew was unable to train to standard because of limitations of the AB-FIST device?*
Thirteen of the 14 said No; one could not think of any area and had no answer.

4. *Overall, does the AB-FIST system work like the BFV? Like the COFT?*
All 14 said that the AB-FIST works the same as the Bradley does, and all 14 said it works the same as or better than the COFT.

5. *What is the best thing about the AB-FIST?*
Some respondents offered only one response; others offered many. Only the first response was tallied, although when multiple responses were offered, there was considerable overlap across personnel. Three SMEs said the best part about the AB-FIST is that the AB-FIST is a full crew trainer, that the driver is included. Three others said training on your own vehicle (a real vehicle, not a simulated vehicle) is good. Three more liked the fact that the AB-FIST is "available when or where you are, " referring to the easy transportability of the device. Three commented on the I/O functions and interface (power up, speed, etc.) and how good they were compared to the COFT. One commented on the variety of target models available, and another on the random appearance of targets within the database. Second and third responses

offered by some paralleled others' responses. Ease of use by the I/O was clearly important.

6. What is the worst thing about the AB-FIST?
Again, only the first response was tallied. For six respondents, the worst thing about the AB-FIST is that the time to install the system is still unknown. Four more commented on the fact that the environmental durability of the system (heat, sand, dust, humidity, cold) is unknown/untested. Two suggested that a problem might arise because the AB-FIST is redundant with the COFT, one cited potential for wear and tear on a vehicle. One could not think of any problem areas.

7. In your opinion, what needs to be changed before the AB-FIST is fielded?
Six said the "blur" on fast slew needs to be eliminated and six said the IRs should be fixed. One suggested the system should be hardened.

8. & 9. How do power up/down procedures compare to the COFT? How do printed records compare? How hard is it to enter crews/retrieve records?
The respondents (including the officers who are not I/Os but listen to their NCOs talk about the COFT) were unanimous (14 of 14) in preference for the AB-FIST. All said the AB-FIST was easier to initiate, the time to do things and the waiting time was shorter, and everything about AB-FIST was less complicated than with the COFT. A few Soldiers had not actually done the power up and down procedures themselves, but had watched it done and wanted to respond to the question anyway. The NCOs also agreed that it was easier to enter crews and save and retrieve crew records with the AB-FIST than with the COFT.

10. *If you were the master gunner, how comfortable would you be using the AB-FIST as a gate to live fire instead of using the COFT? How would you explain it to the commander? Do you have any reservations?*
Twelve of the 14 respondents said that as the master gunner they would have no problem using the AB-FIST as the gate to live fire. One even said he would prefer it to the COFT. One suggested the AB-FIST should complement the COFT, and one said neither the COFT as configured nor the AB-FIST was the answer to gunnery training.

Three said they would explain the choice of the AB-FIST to their commander by telling him that AB-FIST is an appended COFT, and the same as the COFT. Three more said, "It's there. That's all you need," meaning that it would speak for itself. Two commented that they would tell him that the AB-FIST meets doctrine and the standards in FM 23-1, *Bradley gunnery* (1996, 2000, 2002). Others commented on the ability to train the full crew, the excellent graphics, and the safety aspects of getting used to using the actual vehicle. One offered that he would point out to the commander that the AB-FIST meets "the same training objective at less time and less cost." Finally, one NCO said enthusiastically, "I'd take him in there one time."

Eight of the 14 said they had no reservations at all about the AB-FIST. Three said that the IR problems must be fixed prior to the GAT. One said that unknown

reliability and maintainability data might be a problem and two commented directly on the potential for wear and tear on the vehicles.

Final Question

A final question, administered to 13 interviewees, was asked after the full discussion of the AB-FIST. The Soldiers were asked to read each of seven statements, and check the one that best represented their feelings about the AB-FIST device. The stem asked *How well crews who train on gunnery tasks in the AB-FIST will perform them in a field or combat environment compared to crews who train using the COFT.* Ten of the 13 said substantially better or somewhat better; one said probably better, one said as well as. The one who selected neither better nor worse told the interviewer that he had no data either way, so made a conservative selection. No one selected less well or substantially less well.

Discussion

With unanimity, and with apparently genuine enthusiasm, all of the personnel in attendance during the test week were positive about the ability of the AB-FIST to do what the COFT does, and more. The few noticeable problems and IRs (issues with the STAB, some scoring glitches, etc.) were noted, but all participants seemed convinced that they could be fixed prior to the GAT.

Inspection of the questionnaire data shows that the AB-FIST did well in own vehicle comparisons, and was equal to or better than the COFT. There were some instances where the BCs and gunners said that, for example, target acquisition or identification was harder in the AB-FIST than in the COFT. This was always interpreted as a benefit of the AB-FIST; the more intense the training, the better. Several personnel commented that while they thought they were "good" on the COFT, the AB-FIST was almost humbling in the intensity of the challenge. They wrote notes in the margins of the survey to ensure that ARI realized that harder was better. Each questionnaire was designed to overlap with the others – the same question was asked in several different ways. The answers never varied.

As the week wore on, the comments about the AB-FIST became even more positive as the SMEs saw the potential of the system. From a trainer's standpoint they were extremely enthusiastic. They agreed that the I/O Station, both its features and its functionality, provides many enhancements over the COFT's I/O Station. Power up/down procedures, entering crews into the system, etc., are easier and faster in AB-FIST than in the COFT. Crew firing records are exportable to disc. The printer and monitors are commercially available, and unlike the COFT, the AB-FIST runs off 110-power, and can be run off a generator. The printer uses standard paper and unlike the COFT it does not require a special printer system.

The I/O screen has a very good graphic user interface. For most operations the I/O can use either the traditional keyboard, or a mouse, as the AB-FIST screens are

Windows based. In addition to providing function keys for I/O duties, the IOS provides a visual depiction of the turret panels and switch positions so the I/O can see what the crew sees. For example, the I/O can tell if the sear light is on, whether the TOW launcher is up or down, etc., to assist in training. In addition to the I/O screen, a second screen toggles between representation of the gunner's view and the commander's view, and can produce a triple split screen to show the driver's view as well. All of these features enhance the I/O's ability to provide training to the crews.

The only stated drawbacks to the screens centered on the font size. Several questionnaire responses reflected the impression that it was more difficult to see the words on the screen in the AB-FIST than in the COFT. However, further questions about this issue revealed the fact that the problem affected mainly those in need of eyeglasses. Similarly, comments about the low volume of the sound, or missing sounds, were limited to those with admittedly less than acute hearing.

Although only a few personnel had previously participated in the actual task of appending the system to a Bradley, all seemed convinced that they could learn to do so, and do it in a relatively short time. There was no opportunity to try this during the test but it did not dissuade the Soldiers from their overall praise for the system. Several suggested that for the National Guard a dedicated vehicle might be found. The system, once affixed, would be left up for an extended period of time, and thereby reduce the number of times it would be appended and removed. Others suggested that using an otherwise dead-lined vehicle was a way to limit the number of times the system would have to be taken on and off. The benefits of having the trainer available at a training site, whether at an ARNG armory, a gunnery range or with a deployed active duty battalion, were seen to outweigh the potential difficulties involved in actually setting up the system. Concerns about the hardiness of the system were voiced, but cannot as yet be resolved. Fielding of the interim sets to ARNG units will begin to provide data.

Conclusions

The results of the operation of the device, the surveys and the individual interviews were consistent. Almost all personnel described AB-FIST as not only equal to, but better than COFT. They thought crews training on AB-FIST would perform as well as or better than crews training on COFT and no one said a crew could not train to standard on the AB-FIST. Comments about the I/O station, graphics, and target models were overwhelmingly positive.

In interviews and in open comments the Soldiers said they felt the AB-FIST device could be used as a complement to the COFT in ARNG units. They considered it completely acceptable as a substitute for the COFT as a gate to live fire, and to fulfill the simulation training time requirements. Although many admitted privately that they considered the AB-FIST equally acceptable for use by Active Duty personnel, few were willing to try to promote this until after all open IRs have been resolved, and the full functionality (group zero exercises, full driver participation, platoon gunnery, etc.) has been implemented.

There do not appear to be any reasons why the Bradley force should not be able to use AB-FIST as a gate to live fire, and to provide sustainment gunnery training where COFTs are not available. When the final modifications are complete, the device should, based on what has been shown so far, be able to provide opportunities to train new and alternate crews as well, regardless of their location.

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Appendix A
Acronyms

AB-FIST	Advanced Bradley Full-crew Interactive Simulation Trainer
AFIST	Abrams Full Crew Interactive Skills Trainer
ARI	U.S. Army Research Institute
ARNG	U.S. Army National Guard
BATS	Bradley Advanced Training System
BC	Bradley Commander
BFV	Bradley Fighting Vehicle
CCTT	Close Combat Tactical Trainer
COFT	Conduct of Fire Trainer
FIST-B	Full-crew Interactive Simulation Trainer – Bradley
GAT	Government Acceptance Test
I-COFT	Institutional Conduct of Fire Trainer
I/O	Instructor/Operator
IOS	Instructor/Operator Station
IR	Incident Report
M-COFT	Mobile Conduct of Fire Trainer
NCO	Non-commissioned Officer
OV	Own Vehicle
PGS	Precision Gunnery System
PEO-STRI	Program Executive Office for Simulation, Training, and Instrumentation
SIMNET	Simulation Networking
SI/O	Senior Instructor/Operator
SME	Subject Matter Expert
STAB	Stabilization
U-COFT	Unit Conduct of Fire Trainer

Appendix B
Survey Data

Table B-1
BC Post Training survey (N = 12)

Compared to OV and to COFT, AB-FIST is		ME	E	S	H	MH	NA
Perform commander's prepare to fire checks	OV	0	0	9	0	0	3
	COFT	0	4	5	0	0	3
Acquire targets	OV	0	2	5	4	1	0
	COFT	0	3	4	4	0	1
Identify targets - ISU day	OV	0	3	6	2	1	0
	COFT	0	3	5	2	0	0
Identify targets – thermal	OV	0	3	5	3	0	0
	COFT	0	3	7	2	0	0
Distinguish between friendly and enemy targets	OV	0	3	3	5	1	0
	COFT	0	6	4	2	0	0
Determine most dangerous target	OV	0	3	6	3	0	0
	COFT	0	4	7	1	0	0
Sense rounds	OV	1	5	4	2	0	0
	COFT	1	5	5	1	0	0
Estimate range ISU – day	OV	0	0	6	4	0	2
	COFT	0	6	4	0	0	2
Estimate range ISU – thermal	OV	0	0	7	3	0	2
	COFT	0	4	6	0	0	2
Conduct target handoff process	OV	0	2	8	2	0	0
	COFT	0	3	8	1	0	0
Perform battle damage assessment	OV	0	6	4	1	0	1
	COFT	0	6	3	2	0	1
Service multiple targets	OV	0	1	6	5	0	0
	COFT	0	3	5	4	0	0
Track, lead & engage tgts using 25mm BC station	OV	0	2	7	3	0	0
	COFT	0	6	5	1	0	0
Track, lead & engage tgts using coax BC station	OV	0	2	9	1	0	0
	COFT	0	7	5	0	0	0
Use Aux sight	OV	0	3	2	3	1	3
	COFT	0	3	4	2	0	3
Engage targets NBC mode	OV	0	0	6	0	0	6
	COFT	0	2	4	0	0	6
Perform post-fire operations	OV	0	2	7	0	0	3
	COFT	0	4	5	0	0	3
Power down commander's station	OV	0	1	7	0	0	4
	COFT	0	1	7	0	0	4

Table B-2
Gunner Post Training Survey (N = 14)

Compared to OV and to COFT, AB-FIST is		ME	E	S	H	MH	NA
Perform gunner's prepare to fire checks	OV	1	2	7	0	0	4
	COFT	1	2	7	0	0	4
Acquire targets	OV	0	3	6	5	0	0
	COFT	1	4	5	4	0	0
Identify targets - ISU day	OV	0	4	5	4	0	0
	COFT	1	4	7	2	0	0
Identify targets – thermal	OV	0	3	8	3	0	0
	COFT	1	4	6	3	0	0
Distinguish between friendly and enemy targets	OV	0	3	8	3	0	0
	COFT	1	6	4	3	0	0
Track, lead & engage tgts - 25mm power mode	OV	0	0	8	6	0	0
	COFT	1	2	7	4	0	0
Track, lead & engage tgts - 25mm manual mode	OV	0	3	2	2	0	6
	COFT	0	1	6	1	0	6
Track, lead & engage tgts - coax power mode	OV	0	3	5	6	0	0
	COFT	1	4	6	3	0	0
Track, lead & engage tgts – coax manual mode	OV	0	2	3	2	0	7
	COFT	0	2	4	1	0	7
Track, lead & engage tgts – TOW power mode	OV	0	0	8	6	0	0
	COFT	1	3	6	4	0	0
Track, lead & engage tgts – TOW manual mode	OV	0	0	3	2	0	9
	COFT	0	2	2	1	0	9
Sense rounds	OV	0	4	6	4	0	0
	COFT	1	6	4	3	0	0
Adjust rounds	OV	0	4	5	5	0	0
	COFT	1	3	7	3	0	0
Estimate range – ISU Day	OV	0	0	9	4	0	1
	COFT	0	4	8	1	0	1
Estimate range – thermal	OV	0	0	8	2	0	3
	COFT	0	4	6	1	0	3
Determine most dangerous target	OV	0	1	12	1	0	0
	COFT	0	4	8	2	0	0
Perform misfire procedures	OV	0	1	12	1	0	0
	COFT	0	0	13	1	0	0
Engage targets stationary OV – stationary target	OV	0	1	9	3	0	0
	COFT	1	4	6	2	0	1
Engage targets stationary OV – moving target	OV	0	2	8	4	0	0
	COFT	0	5	7	2	0	0
Engage targets moving OV – stationary target	OV	0	1	3	6	1	3
	COFT	0	3	4	3	1	3
Engage targets moving OV – moving target	OV	0	0	3	7	1	3
	COFT	0	3	3	3	1	4
Engage tgts stat & moving OV – stat & moving tgts	OV	0	0	4	6	1	3
	COFT	0	3	4	3	1	0
Use AUX sight	OV	0	1	4	3	0	6
	COFT	0	4	3	1	0	6
Engage targets NBC mode	OV	0	0	5	2	0	7
	COFT	0	2	4	1	0	7

(Table continued)

Engage targets at dawn/dusk	OV	0	1	4	4	0	5
	COFT	0	4	3	2	0	5
Perform post-fire operations	OV	0	2	5	1	0	6
	COFT	0	3	5	0	0	6

Table B-3
I/O Post Training Survey (N = 14)

Compared to COFT, AB-FIST is	**ME**	**E**	**S**	**H**	**MH**	**NA**
Power up the trainer	6	2	0	0	0	6
Prepare I/O station for operation (monitors, etc.)	4	5	0	0	0	5
Enter crew records	2	5	2	0	0	5
Plan and Conduct pre-brief	1	6	4	0	0	3
Use the I/O's monitor screen	6	6	2	0	0	0
Read words on the I/O's monitor screen	1	3	7	3	0	0
Distinguish icons and symbols on the I/O screen	1	12	1	0	0	0
See commander and gunner monitor screens	0	7	4	2	0	1
Monitor crew performance	1	8	4	1	0	0
Hear crew verbal exchanges (fire cmds, alerts)	1	2	10	0	1	0
Acquire targets	4	5	4	1	0	0
Critique crew performance	0	9	5	0	0	0
Interpret scoring	1	7	5	1	0	0
Evaluate written records	1	7	6	0	0	0
Play back engagements	0	6	3	0	0	5
Plan/conduct debrief	0	4	7	0	0	3
Save crew records	0	10	2	0	0	2
Change crews	1	10	2	0	0	1
Power down system	3	5	0	0	0	6
Troubleshoot system	0	6	1	0	0	7

Table B-4
Overall Survey AB-FIST Crews (N = 7)

The AB-FIST device helped me	**SA**	**A**	**N**	**D**	**SD**
accomplish gunnery training to standard	2	5	0	0	0
identify my weaknesses	2	4	1	0	0
identify my strengths	2	5	0	0	0
in target acquisition skills	2	3	0	2	0
in target identification skills	2	3	1	1	0
in target engagement skills	3	4	0	0	0
In crew coordination skills	4	3	0	0	0
prepare for live fire	2	5	0	0	0
The training provided by the AB-FIST					
was at a pace and tempo that met my needs	3	2	2	0	0
was conducted to standard, ***not*** to available time	3	4	0	0	0
has enough variety to hold my interest	3	4	0	0	0
The AB-FIST device					
gave me good practice in degraded mode	2	5	0	0	0
gave me good practice with TOW misfire procedures	2	2	3	0	0
gave me good practice with 25mm misfire procedures	4	3	0	0	0
gave me good practice with Coax misfire procedures	1	5	1	0	0
enabled me to practice my fire commands	5	2	0	0	0
enabled me to communicate with the I/O without difficulty	2	4	0	1	0
enabled the I/O to critique my performance.	2	5	0	0	0
increased my gunnery skills.	3	3	1	0	0
increased my confidence in my gunnery skills	3	4	0	0	0
The gunnery training provided by the AB-FIST					
was beneficial to the test crews	4	3	9	0	0
would be beneficial to new crews	5	1	1	0	0
would be beneficial to experienced crews (sustainment)	4	3	0	0	0
would be beneficial to crews (prepare for Table VIII)	3	3	1	0	0
was to the standards of FM 23-1/ FM 3-22.1	3	4	0	0	0
provides a reliable gate to live fire	3	3	1	0	0
is as good as the training provided by the COFT	4	3	0	0	0

Table B-5
Overall Survey AB-FIST Instructor/Operators (N = 5)

The AB-FIST instructional materials (manuals)	**SA**	**A**	**N**	**D**	**SD**
were clear and easy to follow	0	3	0	2	0
had sufficient graphics/illustrations	0	3	0	2	0
were in the correct sequence	1	4	0	0	0
assisted me in preparing for training	1	4	0	0	0
assisted me in conducting training	1	2	2	0	0
The AB-FIST device helped me					
prepare for training (pre-briefs)	2	1	2	0	0
conduct gunnery training to standard	3	2	0	0	0
identify strong performers	3	2	0	0	0
sustain performance of strong performers	3	2	0	0	0
identify weak performers	3	2	0	0	0
determine/conduct remedial training for weak performers	3	2	0	0	0
prepare for debriefs (with playback function)	1	3	1	0	0
examine crew records	2	2	1	0	0
print crew records	2	2	1	0	0
The training provided by the AB-FIST					
was at a pace and tempo that met crew needs	2	3	0	0	0
was conducted to standard, ***not*** to available time	3	2	0	0	0
has enough variety to hold crew interest	4	1	0	0	0
The AB-FIST device					
facilitates power up procedures	2	3	0	0	0
facilitates power down procedures.	2	3	0	0	0
has user-friendly screens	3	2	0	0	0
enabled me to troubleshoot as needed	1	3	1	0	0
enabled me to hear the crew without difficulty	1	1	1	2	0
enabled me to critique crew in real time (during exercise)	1	4	0	0	0
gave me a headache	0	0	2	1	2
The gunnery training provided by the AB-FIST					
was beneficial to the test crews	3	2	0	0	0
would be beneficial to new crews	4	1	0	0	0
would be beneficial to experienced crews (sustainment)	3	2	0	0	0
would be beneficial to crews (prepare for Table VIII)	4	1	0	0	0
was to the standards of FM 23-1/ FM 3-22.1	2	3	0	0	0
provides a reliable gate to live fire	2	2	1	0	0
is as good as the training provided by the COFT	4	1	0	0	0